**Methods**

Data

Survival estimates

We obtained survival estimates of raptor species as reviewed by Newton, McGrady, and Oli (2016). We extracted information from their database to only include studies with estimates for adult birds obtained through formalized statistical methods (i.e., Methods 3-6: capture-mark-recapture or resight, joint live encounters-ring recoveries, radiotracking, multiple data types), and studies that indicated their sample size. We used age-, sex-, year-, area-, and group-specific estimates of survival when available. However, where separate estimates for age groups were provided but age-specific sample sizes were not, we used the arithmetic mean among all age groups (same as for sex, year, area and other groupings). We then assigned each value of a survival estimate that was obtained through methods 3 and 5 as apparent survival estimate (1), and values obtained through methods 4 and 6 as true survival estimate (0).

For studies that do not explicitly report the number of dead birds (i.e., apparent survival estimates reported), we estimated these values using the equation:

ndead= n*j* - (n*j* \* p*i, j*) (Eqn. 1)

where n*j* is the sample size in study *j*, and p*i, j* is the survival estimate of species *i* reported in study *j.*

Body mass

We used the average body mass (kg) of the adults of each species provided by Ferguson-Lees and Christie (2001). When sex-specific survival estimates were provided, we used the average body mass for the given sex of a given species. Otherwise, we used the arithmetic mean of the body mass for both males and females of a given species.

Data Analysis

Beta-binomial model for evaluating survival-mass relationships

We evaluated the relationship between body mass and the survival estimates of raptor species using a hierarchical beta-binomial model. This approach is used to evaluate the probabilities of observing successes (i.e., total number of survivors) given a number of trials (i.e., sample size), with the probabilities assumed to follow a beta distribution (i.e., survival estimates; Lee and Sabavala, 1987). The versatility of this modelling framework has been widely used in the fields of epidemiology (Griffiths, 1973), medical diagnostics (Kuss, Hoyer, and Soms, 2014), mental testing (Lord, 1965), and human-environmental studies (Layton and Siikamäki, 2009). Here, we used a hierarchical beta-binomial model where the intercept was allowed to vary for each species and study. The model had the form:

(Eqn. 2)

(Eqn. 3)

(Eqn. 4)

In Eqn. 2, yi,j is the total number of survived species *i* in study *j* drawn from a binomial distribution with the parameters *n* (sample size)and *p* (probability of survival). The probability parameter *p* is drawn from a beta distribution with shape parameters (α1 and α2). Each shape parameter is modelled as a function of the estimated survival probability with variance parameter (; Eqn. 3). We modelled the *p* with the following parameters (Eqn. 4): β0 is the intercept for species *i* in study *j*, β1 is the slope for body mass, and β2 is the slope for the type of survival estimate (i.e., apparent or true).

Model implementation and diagnostics

We implemented the model in a Bayesian framework and used weakly-informed priors for all parameters, except the variance term (for the shape parameters) which was informed using results obtained from preliminary assessments (Gelman et al., 2008; See Appendix for more details on the preliminary assessments conducted). We based parameter estimates from the beta-binomial model on four chains of 3000 iterations with 1000 for warm-up period. We assessed model convergence and mixing of chains through visual inspection and by using the Gelman-Rubin (1992) diagnostic (R̂) and the effective sample size. We performed posterior predictive checks to evaluate deviations of model-generated data from the observed data. We then assessed the predictive performance of our model using k-fold cross validation methods. We interfaced to Stan using the ‘rstan’ package to fit our model in R ver 3.6.3 (Stan Development Team, 2019; R Core Team, 2018).

Model interpretation and forecasting

We report estimates on their original scale (i.e., survival estimate). We interpreted the effect of variables with the probability of direction (PD). PD describes the probability of the values of the coefficient estimates to be positive or negative (Makowski et al., 2019). Specifically, we quantified the probability of the effect of mass, and the estimate type (apparent or true) on the survival estimate.

We used the mean estimates for the main parameters of our model to predict the survival of other raptor species. We used the species-specific body mass of the adults of 523 species provided through the EltonTraits database (Wilman et al. 2016) and input them in the model equation to generate forecasted survival estimates for each species (fpi):

fpi = inv\_logit ( (Eqn. 5)

**Results**

We reviewed 65 journal articles on the survival estimates of 36 raptor species. Of these 65 references, 11 reported true survival of six raptor species. On average, adult raptors included in the analysis had an average survival of 0.72. Moreover, the negative effect of estimate type was slightly weak (P (β2 < 0)= 0.82). This suggests that values obtained based on methods yielding apparent survival estimates are generally lower.

Body mass-survival relationship

Our model suggests a positive association between average body mass and survival of raptor species (P (β1 > 0) = 0.90; Fig. 1). In fact, for species weighing <1.5 kg, the mean survival was around 69%, for species weighing from 1.6 to <6 kg, their mean survival was around 81%, and for larger-bodied species ( >6.1 kg), their mean survival was around 86%.

Forecasted survival estimates

The predicted survival of 523 raptor species ranged from 61% to 97%, with the larger species (>6 kg) predicted to have higher survival estimates ( ≥ 90%; e.g., Andean Condor= 97% , Himalayan and Cinereous Vulture= 95%, California Condor and Cape Vulture= 93%, Steller’s Sea Eagle=92%; Griffon and Ruepell’s Vulture= 91%; Lappet-faced Vulture= 90%; Fig.1; Appendix Table 1). Medium-sized species (>1.5 kg, <6 kg) had a forecasted average survival estimate of 77%. Finally, smaller-bodied species (≤1.5 kg) had an average forecasted survival estimate of 64%.

**Figures**

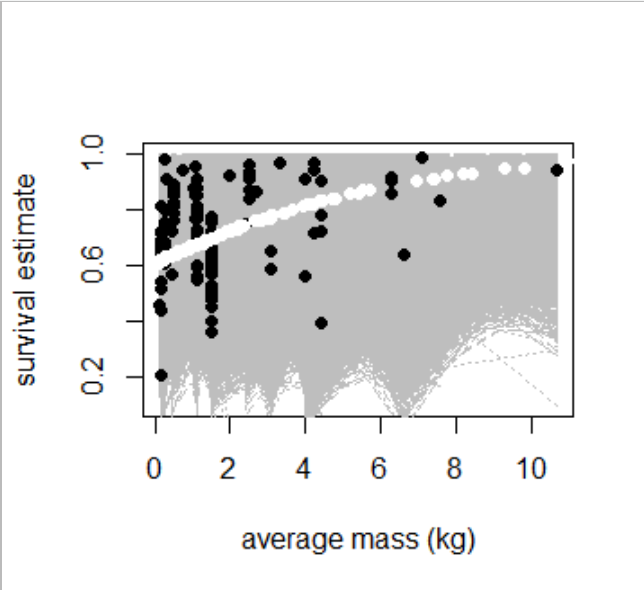


Fig.1. Posterior estimates of the relationship between survival estimate and body mass of raptor species. Each gray line indicates 1 of the 3000 posterior draws from the beta-binomial model. Black-filled circles are the survival estimates of the 36 raptor species, whose information where included in the model. White-filled circles are the forecasted survival estimates of 523 raptor species.

**Appendix**

*Model code*

|  |
| --- |
| data{  int<lower=0> N; // no.of observations  int <lower=0> y[N]; // survivors  int <lower=0> n[N]; // total  vector [N] mass;// ave.mass in kg  int species[N]; //ID of each species  int study [N]; //ID of study  int Nsp; //no.of species  int Nst; //no.of studies  vector [N]death\_type;// direct/indirect  }  parameters {  real alpha;// global intercept  real alpha\_sp[Nsp]; //random intercept per species  real alpha\_st [Nst];// random intercept per study  real beta1; //slope mass  real beta2; //slope indirect effect  real<lower=0> sigma\_sp;//errors for random effects  real<lower=0> sigma\_st;//errors for random effects  real <lower=0> phi;  real <lower=0, upper=1> pred\_surv[N] ;  }    transformed parameters{  vector <lower=0, upper=1> [N] surv\_mu; //estimated survival  vector <lower=0> [N] A;  vector <lower=0> [N] B;    //model:    for (i in 1:N){    surv\_mu[i]= inv\_logit(alpha\_sp[species[i]]+alpha\_st[study[i]]+beta1\*mass[i]+beta2\*death\_type[i]);  }    A = surv\_mu \* phi;  B = (1 - surv\_mu)\* phi;    }    model {  //priors    beta1~ normal (0,1);  beta2~ normal (0,1);  sigma\_sp ~normal(0,1);  sigma\_st~ normal(0,1);    phi ~normal(7,1);// use info. from beta regression of all juv and adult    //model likelihood:    pred\_surv ~ beta(A, B); // survival estimate, beta dist.  y~binomial(n, pred\_surv); //no.of survivors drawn from binomial dist; based on sample size and reported survival estimate    alpha\_sp~normal(alpha, sigma\_sp);  alpha\_st~normal(alpha, sigma\_st);    }  generated quantities {    real pred\_y [N];//predictions on survival  pred\_y = beta\_rng(A, B);    } |

Appendix Table 1. Forecasted survival estimates of raptor species. Estimates derived from Eqn.5 in manuscript.

|  |  |  |
| --- | --- | --- |
| **Species** | **mass (kg)** | **survival estimate** |
| Andean Condor | 11.24 | 0.97 |
| Himalayan Vulture | 9.8 | 0.95 |
| Cinereous Vulture | 9.32 | 0.95 |
| California Condor | 8.44 | 0.93 |
| Cape Vulture | 8.18 | 0.93 |
| Steller's Sea-eagle | 7.76 | 0.92 |
| Griffon Vulture | 7.44 | 0.91 |
| Rueppell's Vulture | 7.4 | 0.91 |
| Lappet-faced Vulture | 6.97 | 0.90 |
| Lammergeier | 5.69 | 0.87 |
| Indian Vulture | 5.52 | 0.87 |
| Slender-billed Vulture | 5.52 | 0.87 |
| White-backed Vulture | 5.43 | 0.86 |
| Philippine Eagle | 5.18 | 0.86 |
| Harpy Eagle | 4.8 | 0.84 |
| White-tailed Eagle | 4.73 | 0.84 |
| Bald Eagle | 4.7 | 0.84 |
| Red-headed Vulture | 4.47 | 0.83 |
| White-rumped Vulture | 4.39 | 0.83 |
| Golden Eagle | 4.25 | 0.82 |
| Verreaux's Eagle | 4.2 | 0.82 |
| Secretarybird | 4.02 | 0.82 |
| Martial Eagle | 3.96 | 0.81 |
| Crowned Hawk-eagle | 3.64 | 0.80 |
| Wedge-tailed Eagle | 3.45 | 0.79 |
| African Fish-eagle | 3.4 | 0.79 |
| King Vulture | 3.4 | 0.79 |
| Eastern Imperial Eagle | 3.13 | 0.78 |
| Black-and-chestnut Eagle | 3.09 | 0.78 |
| Gurney's Eagle | 3.06 | 0.77 |
| White-headed Vulture | 3.02 | 0.77 |
| Madagascar Fish-eagle | 3 | 0.77 |
| Solitary Eagle | 3 | 0.77 |
| Mountain Hawk-eagle | 3 | 0.77 |
| Spanish Imperial Eagle | 2.96 | 0.77 |
| Crowned Eagle | 2.95 | 0.77 |
| Pallas's Fish-eagle | 2.89 | 0.77 |
| White-bellied Sea-eagle | 2.83 | 0.76 |
| Steppe Eagle | 2.71 | 0.76 |
| Eurasian Eagle-owl | 2.67 | 0.76 |
| Black-chested Buzzard-eagle | 2.38 | 0.74 |
| Tawny Fish-owl | 2.32 | 0.74 |
| Tawny Eagle | 2.24 | 0.74 |
| Bateleur | 2.2 | 0.73 |
| Greater Spotted Eagle | 2.15 | 0.73 |
| Giant Eagle-owl | 2.11 | 0.73 |
| Pharaoh Eagle-owl | 2.1 | 0.73 |
| Egyptian Vulture | 2.08 | 0.73 |
| Brown Snake-eagle | 2.05 | 0.73 |
| Hooded Vulture | 2.04 | 0.73 |
| Snowy Owl | 2.03 | 0.72 |
| Sanford's Sea-eagle | 1.98 | 0.72 |
| New Guinea Eagle | 1.96 | 0.72 |
| Pel's Fishing-owl | 1.94 | 0.72 |
| Bonelli's Eagle | 1.94 | 0.72 |
| Black Vulture | 1.88 | 0.72 |
| Madagascar Serpent-eagle | 1.79 | 0.71 |
| Crested Eagle | 1.75 | 0.71 |
| Short-toed Snake-eagle | 1.7 | 0.71 |
| Palm-nut Vulture | 1.6 | 0.70 |
| Grey-headed Fish-eagle | 1.59 | 0.70 |
| Great Horned Owl | 1.58 | 0.70 |
| Beaudouin's Snake-eagle | 1.54 | 0.70 |
| Barred Eagle-owl | 1.53 | 0.70 |
| Jackal Buzzard | 1.53 | 0.70 |
| Turkey Vulture | 1.52 | 0.70 |
| Black-chested Snake-eagle | 1.5 | 0.70 |
| Osprey | 1.48 | 0.70 |
| Changeable Hawk-eagle | 1.48 | 0.70 |
| Flores Hawk-eagle | 1.48 | 0.70 |
| African Hawk-eagle | 1.47 | 0.69 |
| Ferruginous Hawk | 1.44 | 0.69 |
| Gyr Falcon | 1.43 | 0.69 |
| Spot-bellied Eagle-owl | 1.4 | 0.69 |
| Red-legged Seriema | 1.4 | 0.69 |
| Dusky Eagle-owl | 1.39 | 0.69 |
| Philippine Eagle-owl | 1.39 | 0.69 |
| Javan Hawk-eagle | 1.39 | 0.69 |
| Sulawesi Hawk-eagle | 1.39 | 0.69 |
| Gray-bellied Hawk | 1.37 | 0.69 |
| Greater Yellow-headed Vulture | 1.37 | 0.69 |
| Upland Buzzard | 1.36 | 0.69 |
| Lesser Spotted Eagle | 1.36 | 0.69 |
| Indian Spotted Eagle | 1.36 | 0.69 |
| Powerful Owl | 1.35 | 0.69 |
| Black-legged Seriema | 1.3 | 0.69 |
| Buffy Fish-owl | 1.29 | 0.68 |
| Shelley's Eagle-owl | 1.26 | 0.68 |
| Black-breasted Buzzard | 1.2 | 0.68 |
| Ornate Hawk-eagle | 1.2 | 0.68 |
| Rufous-tailed Hawk | 1.19 | 0.68 |
| Striated Caracara | 1.19 | 0.68 |
| Long-legged Buzzard | 1.17 | 0.68 |
| Philippine Hawk-eagle | 1.17 | 0.68 |
| Lesser Horned Owl | 1.17 | 0.68 |
| Fearful Owl | 1.16 | 0.68 |
| Great Black-hawk | 1.15 | 0.68 |
| Oriental Honey-buzzard | 1.14 | 0.68 |
| Galapagos Hawk | 1.14 | 0.68 |
| Cape Eagle-owl | 1.12 | 0.68 |
| Banded Snake-eagle | 1.12 | 0.68 |
| Brown Fish-owl | 1.11 | 0.67 |
| Rock Eagle-owl | 1.1 | 0.67 |
| Red-tailed Hawk | 1.1 | 0.67 |
| Augur Buzzard | 1.1 | 0.67 |
| Southern Caracara | 1.08 | 0.67 |
| Crested Caracara | 1.08 | 0.67 |
| Red Kite | 1.07 | 0.67 |
| Long-crested Eagle | 1.07 | 0.67 |
| Great Grey Owl | 1.06 | 0.67 |
| Henst's Goshawk | 1.05 | 0.67 |
| Cassin's Hawk-eagle | 1.05 | 0.67 |
| Black Eagle | 1.03 | 0.67 |
| Spotted Wood-owl | 1.01 | 0.67 |
| Southern Banded Snake-eagle | 1.01 | 0.67 |
| Black Hawk-eagle | 1.01 | 0.67 |
| Doria's Goshawk | 1 | 0.67 |
| Slate-coloured Hawk | 1 | 0.67 |
| Barred Hawk | 1 | 0.67 |
| Carunculated Caracara | 0.99 | 0.67 |
| Spectacled Owl | 0.98 | 0.67 |
| Common Black-hawk | 0.98 | 0.67 |
| Cuban Black Hawk | 0.98 | 0.67 |
| Brown Wood-owl | 0.97 | 0.67 |
| Saker Falcon | 0.96 | 0.67 |
| Swainson's Hawk | 0.95 | 0.67 |
| Rough-legged Hawk | 0.95 | 0.67 |
| Blakiston's Fish-owl | 0.94 | 0.66 |
| South Nicobar Serpent-eagle | 0.94 | 0.66 |
| Mountain Serpent-eagle | 0.94 | 0.66 |
| Sulawesi Serpent-eagle | 0.94 | 0.66 |
| Lesser Yellow-headed Vulture | 0.94 | 0.66 |
| Rufous Owl | 0.93 | 0.66 |
| Andaman Serpent-eagle | 0.9 | 0.66 |
| Red Goshawk | 0.89 | 0.66 |
| White-tailed Hawk | 0.89 | 0.66 |
| Northern Goshawk | 0.87 | 0.66 |
| Ridgway's Hawk | 0.87 | 0.66 |
| Archer's Buzzard | 0.87 | 0.66 |
| Harris's Hawk | 0.85 | 0.66 |
| Black-and-white Hawk-eagle | 0.85 | 0.66 |
| Blyth's Hawk-eagle | 0.83 | 0.66 |
| Usambara Eagle-owl | 0.82 | 0.66 |
| Booted Eagle | 0.82 | 0.66 |
| Savanna Hawk | 0.81 | 0.66 |
| Ayres's Hawk-eagle | 0.81 | 0.66 |
| White-throated Caracara | 0.81 | 0.66 |
| Rufous-bellied Eagle | 0.8 | 0.66 |
| Rufous Fishing-owl | 0.79 | 0.66 |
| Mountain Caracara | 0.79 | 0.66 |
| Ural Owl | 0.78 | 0.66 |
| Lesser Fish-eagle | 0.78 | 0.66 |
| Red-backed Hawk | 0.78 | 0.66 |
| Little Eagle | 0.78 | 0.66 |
| Black Falcon | 0.78 | 0.66 |
| New Guinea Hawk-eagle | 0.78 | 0.66 |
| Black-collared Hawk | 0.77 | 0.65 |
| Meyer's Goshawk | 0.76 | 0.65 |
| Common Buzzard | 0.76 | 0.65 |
| Laggar Falcon | 0.76 | 0.65 |
| Peregrine Falcon | 0.76 | 0.65 |
| Barbary Falcon | 0.76 | 0.65 |
| European Honey-buzzard | 0.75 | 0.65 |
| Whistling Kite | 0.75 | 0.65 |
| Swamp Harrier | 0.75 | 0.65 |
| Zone-tailed Hawk | 0.75 | 0.65 |
| Black Honey-buzzard | 0.73 | 0.65 |
| Black Kite | 0.73 | 0.65 |
| Barred Honey-buzzard | 0.72 | 0.65 |
| Barred Owl | 0.71 | 0.65 |
| Philippine Serpent-eagle | 0.71 | 0.65 |
| Prairie Falcon | 0.71 | 0.65 |
| Band-bellied Owl | 0.7 | 0.65 |
| Congo Serpent-eagle | 0.7 | 0.65 |
| Western Marsh-harrier | 0.7 | 0.65 |
| Black Goshawk | 0.7 | 0.65 |
| White Hawk | 0.7 | 0.65 |
| Mountain Buzzard | 0.7 | 0.65 |
| Spotted Eagle-owl | 0.69 | 0.65 |
| Gundlach's Hawk | 0.68 | 0.65 |
| Dark Chanting-goshawk | 0.67 | 0.65 |
| Sooty Owl | 0.66 | 0.65 |
| Reunion Harrier | 0.66 | 0.65 |
| Pale Chanting-goshawk | 0.66 | 0.65 |
| Grey-backed Hawk | 0.66 | 0.65 |
| Rufous Crab-hawk | 0.66 | 0.65 |
| Red-necked Buzzard | 0.66 | 0.65 |
| Madagascar Harrier | 0.66 | 0.65 |
| Fraser's Eagle-owl | 0.65 | 0.65 |
| Bat Hawk | 0.65 | 0.65 |
| Vermiculated Fishing-owl | 0.64 | 0.65 |
| Wahlberg's Eagle | 0.64 | 0.65 |
| Australian Masked-owl | 0.63 | 0.65 |
| African Harrier-hawk | 0.63 | 0.65 |
| Eastern Chanting-goshawk | 0.63 | 0.65 |
| Laughing Falcon | 0.62 | 0.65 |
| Collared Forest-falcon | 0.62 | 0.65 |
| Red-throated Caracara | 0.62 | 0.65 |
| Lanner Falcon | 0.61 | 0.65 |
| Crested Serpent-eagle | 0.6 | 0.64 |
| White-necked Hawk | 0.6 | 0.64 |
| Mantled Hawk | 0.6 | 0.64 |
| Red-shouldered Hawk | 0.6 | 0.64 |
| Spotted Owl | 0.59 | 0.64 |
| Brown Falcon | 0.59 | 0.64 |
| Barking Owl | 0.58 | 0.64 |
| White-collared Kite | 0.58 | 0.64 |
| Square-tailed Kite | 0.58 | 0.64 |
| Chestnut-shouldered Goshawk | 0.58 | 0.64 |
| Stygian Owl | 0.57 | 0.64 |
| Long-tailed Honey-buzzard | 0.57 | 0.64 |
| Madagascar Harrier-hawk | 0.57 | 0.64 |
| Mottled Wood-owl | 0.56 | 0.64 |
| Fulvous Owl | 0.56 | 0.64 |
| Pere David's Owl | 0.56 | 0.64 |
| Rufous-banded Owl | 0.56 | 0.64 |
| Eastern Marsh-harrier | 0.56 | 0.64 |
| Spotted Harrier | 0.56 | 0.64 |
| Wallace's Hawk-eagle | 0.56 | 0.64 |
| Slaty-backed Forest-falcon | 0.55 | 0.64 |
| Crested Owl | 0.54 | 0.64 |
| Akun Eagle-owl | 0.53 | 0.64 |
| Brahminy Kite | 0.53 | 0.64 |
| Sulawesi Golden Owl | 0.52 | 0.64 |
| Taliabu Masked-owl | 0.52 | 0.64 |
| Lesser Masked-owl | 0.52 | 0.64 |
| Manus Masked-owl | 0.52 | 0.64 |
| Bismarck Masked-owl | 0.52 | 0.64 |
| Sulawesi Owl | 0.52 | 0.64 |
| Ashy-faced Owl | 0.52 | 0.64 |
| Grey Hawk | 0.52 | 0.64 |
| White-throated Hawk | 0.52 | 0.64 |
| African Marsh-harrier | 0.51 | 0.64 |
| Long-winged Harrier | 0.51 | 0.64 |
| Black Harrier | 0.51 | 0.64 |
| Madagascar Buzzard | 0.51 | 0.64 |
| Short-tailed Hawk | 0.5 | 0.64 |
| Hawaiian Hawk | 0.5 | 0.64 |
| Greyish Eagle-Owl | 0.5 | 0.64 |
| Long-tailed Hawk | 0.49 | 0.64 |
| Tawny-browed Owl | 0.48 | 0.64 |
| Plumbeous Hawk | 0.48 | 0.64 |
| Tawny Owl | 0.47 | 0.64 |
| Grey-headed Kite | 0.47 | 0.64 |
| Black-and-white Owl | 0.46 | 0.64 |
| Buckley's Forest-falcon | 0.46 | 0.64 |
| Orange-breasted Falcon | 0.46 | 0.64 |
| Grey Falcon | 0.46 | 0.64 |
| Broad-winged Hawk | 0.45 | 0.64 |
| Striped Owl | 0.44 | 0.64 |
| Slender-billed Kite | 0.43 | 0.63 |
| Cooper's Hawk | 0.43 | 0.63 |
| American Swallow-tailed Kite | 0.42 | 0.63 |
| New Zealand Falcon | 0.42 | 0.63 |
| Abyssinian Owl | 0.41 | 0.63 |
| Madagascar Owl | 0.41 | 0.63 |
| Grey-faced Buzzard | 0.41 | 0.63 |
| Barn Owl | 0.4 | 0.63 |
| Cinereous Harrier | 0.4 | 0.63 |
| Northern Harrier | 0.39 | 0.63 |
| Eleonora's Falcon | 0.39 | 0.63 |
| Rufous-legged Owl | 0.38 | 0.63 |
| Pallid Harrier | 0.38 | 0.63 |
| African Goshawk | 0.38 | 0.63 |
| Black-banded Owl | 0.37 | 0.63 |
| Snail Kite | 0.37 | 0.63 |
| Chilean Hawk | 0.37 | 0.63 |
| African Grass-owl | 0.36 | 0.63 |
| Jerdon's Baza | 0.36 | 0.63 |
| Brown Goshawk | 0.36 | 0.63 |
| Eastern Grass-owl | 0.35 | 0.63 |
| Rusty-barred Owl | 0.35 | 0.63 |
| African Wood-owl | 0.35 | 0.63 |
| Sumba Boobook | 0.35 | 0.63 |
| Andaman Hawk-owl | 0.35 | 0.63 |
| Ochre-bellied Hawk-owl | 0.35 | 0.63 |
| Bismarck Hawk-owl | 0.35 | 0.63 |
| White-tailed Kite | 0.35 | 0.63 |
| White-browed Hawk | 0.35 | 0.63 |
| Black Caracara | 0.35 | 0.63 |
| Jamaican Owl | 0.34 | 0.63 |
| Pied Harrier | 0.34 | 0.63 |
| Rufous-winged Buzzard | 0.34 | 0.63 |
| Aplomado Falcon | 0.34 | 0.63 |
| Marsh Owl | 0.33 | 0.63 |
| Nicobar Sparrowhawk | 0.33 | 0.63 |
| Grey Goshawk | 0.33 | 0.63 |
| Moluccan Goshawk | 0.33 | 0.63 |
| New Britain Goshawk | 0.33 | 0.63 |
| Semicollared Hawk | 0.33 | 0.63 |
| Small Sparrowhawk | 0.33 | 0.63 |
| White-breasted Hawk | 0.33 | 0.63 |
| Grasshopper Buzzard | 0.33 | 0.63 |
| White-eyed Buzzard | 0.33 | 0.63 |
| Chaco Owl | 0.33 | 0.63 |
| Northern Hawk Owl | 0.32 | 0.63 |
| Short-eared Owl | 0.32 | 0.63 |
| Pacific Baza | 0.32 | 0.63 |
| Letter-winged Kite | 0.32 | 0.63 |
| Yellow-headed Caracara | 0.32 | 0.63 |
| Montagu's Harrier | 0.31 | 0.63 |
| Black-faced Hawk | 0.31 | 0.63 |
| Long-eared Owl | 0.3 | 0.63 |
| Crane Hawk | 0.3 | 0.63 |
| Chimango Caracara | 0.3 | 0.63 |
| Madagascar Baza | 0.29 | 0.63 |
| Hook-billed Kite | 0.29 | 0.63 |
| Bicoloured Hawk | 0.29 | 0.63 |
| Semiplumbeous Hawk | 0.29 | 0.63 |
| White-rumped Hawk | 0.29 | 0.63 |
| Cuban Kite | 0.29 | 0.63 |
| Madagascar Red Owl | 0.28 | 0.63 |
| Oriental Bay-owl | 0.28 | 0.63 |
| Mottled Owl | 0.28 | 0.63 |
| Southern Boobook | 0.28 | 0.63 |
| Papuan Hawk-owl | 0.28 | 0.63 |
| African Baza | 0.28 | 0.63 |
| Mississippi Kite | 0.28 | 0.63 |
| Lizard Buzzard | 0.28 | 0.63 |
| Black-shouldered Kite | 0.27 | 0.62 |
| Crested Goshawk | 0.27 | 0.62 |
| Black-mantled Goshawk | 0.27 | 0.62 |
| Roadside Hawk | 0.27 | 0.62 |
| Fox Kestrel | 0.27 | 0.62 |
| Black-winged Kite | 0.26 | 0.62 |
| Greater Kestrel | 0.26 | 0.62 |
| Giant Scops-owl | 0.25 | 0.62 |
| Plumbeous Kite | 0.25 | 0.62 |
| Sulawesi Goshawk | 0.25 | 0.62 |
| Pied Goshawk | 0.25 | 0.62 |
| Sooty Falcon | 0.25 | 0.62 |
| Australian Hobby | 0.25 | 0.62 |
| Taita Falcon | 0.25 | 0.62 |
| Red-chested Goshawk | 0.25 | 0.62 |
| Forest Owlet | 0.24 | 0.62 |
| White-browed Hawk-owl | 0.23 | 0.62 |
| Plain-breasted Hawk | 0.23 | 0.62 |
| Grey Kestrel | 0.23 | 0.62 |
| Hume's Owl | 0.22 | 0.62 |
| Double-toothed Kite | 0.22 | 0.62 |
| Imitator Sparrowhawk | 0.22 | 0.62 |
| Eurasian Sparrowhawk | 0.22 | 0.62 |
| Spotted Kestrel | 0.22 | 0.62 |
| Moluccan Hawk-owl | 0.21 | 0.62 |
| Manus Hawk-owl | 0.21 | 0.62 |
| Russet Hawk-owl | 0.21 | 0.62 |
| Fiji Goshawk | 0.21 | 0.62 |
| Slaty-mantled Sparrowhawk | 0.21 | 0.62 |
| Grey-headed Goshawk | 0.21 | 0.62 |
| Lined Forest-falcon | 0.21 | 0.62 |
| Dickinson's Kestrel | 0.21 | 0.62 |
| Red-necked Falcon | 0.21 | 0.62 |
| Eurasian Hobby | 0.21 | 0.62 |
| Southern White-faced Owl | 0.21 | 0.62 |
| Cryptic Forest-falcon | 0.21 | 0.62 |
| Congo Bay-owl | 0.2 | 0.62 |
| White-faced Scops-owl | 0.2 | 0.62 |
| Asian Barred Owlet | 0.2 | 0.62 |
| Solomons Hawk-owl | 0.2 | 0.62 |
| Rufous-thighed Kite | 0.2 | 0.62 |
| White-bellied Goshawk | 0.2 | 0.62 |
| Ovampo Sparrowhawk | 0.2 | 0.62 |
| Rufous-chested Sparrowhawk | 0.2 | 0.62 |
| Oriental Hobby | 0.2 | 0.62 |
| Brown Hawk-owl | 0.19 | 0.62 |
| Black Baza | 0.19 | 0.62 |
| Levant Sparrowhawk | 0.19 | 0.62 |
| Plumbeous Forest-falcon | 0.19 | 0.62 |
| Merlin | 0.19 | 0.62 |
| Philippine Scops-owl | 0.18 | 0.62 |
| Eastern Screech-owl | 0.18 | 0.62 |
| Long-tufted Screech-owl | 0.18 | 0.62 |
| Maned Owl | 0.18 | 0.62 |
| Southern Boobook | 0.18 | 0.62 |
| Christmas Island Hawk-owl | 0.18 | 0.62 |
| Madagascar Sparrowhawk | 0.18 | 0.62 |
| Barred Forest-falcon | 0.18 | 0.62 |
| Common Kestrel | 0.18 | 0.62 |
| African Hobby | 0.18 | 0.62 |
| Moluccan Scops-owl | 0.17 | 0.62 |
| Biak Scops-owl | 0.17 | 0.62 |
| Rufescent Screech-owl | 0.17 | 0.62 |
| Little Owl | 0.17 | 0.62 |
| Gabar Goshawk | 0.17 | 0.62 |
| Collared Sparrowhawk | 0.17 | 0.62 |
| Vinous-breasted Sparrowhawk | 0.17 | 0.62 |
| Spot-winged Falconet | 0.17 | 0.62 |
| Mauritius Kestrel | 0.17 | 0.62 |
| Nankeen Kestrel | 0.17 | 0.62 |
| Banded Kestrel | 0.17 | 0.62 |
| Colombian Screech-owl | 0.17 | 0.62 |
| Siau Scops-owl | 0.17 | 0.62 |
| Balsas Screech-owl | 0.16 | 0.62 |
| Bare-shanked Screech-owl | 0.16 | 0.62 |
| White-throated Screech-owl | 0.16 | 0.62 |
| Chestnut-flanked Sparrowhawk | 0.16 | 0.62 |
| Chinese Goshawk | 0.16 | 0.62 |
| Rufous-necked Sparrowhawk | 0.16 | 0.62 |
| Bat Falcon | 0.16 | 0.62 |
| Collared Scops-owl | 0.15 | 0.62 |
| Pacific Screech-owl | 0.15 | 0.62 |
| Burrowing Owl | 0.15 | 0.62 |
| Speckled Hawk-owl | 0.15 | 0.62 |
| Spot-tailed Goshawk | 0.15 | 0.62 |
| Lesser Kestrel | 0.15 | 0.62 |
| Red-footed Falcon | 0.15 | 0.62 |
| Collared Scops Owl | 0.14 | 0.62 |
| Sunda Scops Owl | 0.14 | 0.62 |
| Western Screech-owl | 0.14 | 0.62 |
| Puerto Rican Screech-owl | 0.14 | 0.62 |
| Sjostedt's Owlet | 0.14 | 0.62 |
| Boreal Owl | 0.14 | 0.62 |
| Frances's Sparrowhawk | 0.14 | 0.62 |
| New Britain Sparrowhawk | 0.14 | 0.62 |
| Amur Falcon | 0.14 | 0.62 |
| Tropical Screech-owl | 0.13 | 0.62 |
| West Peruvian Screech-owl | 0.13 | 0.62 |
| Tawny-bellied Screech-owl | 0.13 | 0.62 |
| Philippine Hawk-owl | 0.13 | 0.62 |
| Jungle Hawk-owl | 0.13 | 0.62 |
| Shikra | 0.13 | 0.62 |
| Sharp-shinned Hawk | 0.13 | 0.62 |
| Rufous-thighed Hawk | 0.13 | 0.62 |
| White-fronted Scops-owl | 0.12 | 0.62 |
| Andaman Scops-owl | 0.12 | 0.62 |
| Mindoro Scops-owl | 0.12 | 0.62 |
| Elegant Scops-owl | 0.12 | 0.62 |
| Flores Scops-owl | 0.12 | 0.62 |
| Seychelles Scops-owl | 0.12 | 0.62 |
| Pemba Scops-owl | 0.12 | 0.62 |
| Anjouan Scops-owl | 0.12 | 0.62 |
| Rajah Scops-owl | 0.12 | 0.62 |
| Japanese Scops Owl | 0.12 | 0.62 |
| Mentawai Scops-owl | 0.12 | 0.62 |
| Palawan Scops-owl | 0.12 | 0.62 |
| Wallace's Scops-owl | 0.12 | 0.62 |
| Koepcke's Screech-owl | 0.12 | 0.62 |
| Black-capped Screech-owl | 0.12 | 0.62 |
| Vermiculated Screech-owl | 0.12 | 0.62 |
| Palau Scops-owl | 0.12 | 0.62 |
| African Barred Owlet | 0.12 | 0.62 |
| Buff-fronted Owl | 0.12 | 0.62 |
| Japanese Sparrowhawk | 0.12 | 0.62 |
| Besra | 0.12 | 0.62 |
| Madagascar Kestrel | 0.12 | 0.62 |
| Nicobar Scops-owl | 0.12 | 0.62 |
| Mantanani Scops-owl | 0.11 | 0.62 |
| Montane Forest Screech-owl | 0.11 | 0.62 |
| Spotted Owlet | 0.11 | 0.62 |
| African Swallow-tailed Kite | 0.11 | 0.62 |
| Red-thighed Sparrowhawk | 0.11 | 0.62 |
| American Kestrel | 0.11 | 0.62 |
| Serendib Scops-owl | 0.11 | 0.62 |
| Simeulue Scops-owl | 0.1 | 0.61 |
| Enggano Scops-owl | 0.1 | 0.61 |
| Malagasy Scops-owl | 0.1 | 0.61 |
| Cloud-forest Screech-owl | 0.1 | 0.61 |
| Bare-legged Owl | 0.1 | 0.61 |
| Jungle Owlet | 0.1 | 0.61 |
| Chestnut-backed Owlet | 0.1 | 0.61 |
| Chestnut Owlet | 0.1 | 0.61 |
| Northern Saw-whet Owl | 0.1 | 0.61 |
| Tiny Hawk | 0.1 | 0.61 |
| White-rumped Falcon | 0.1 | 0.61 |
| Moheli Scops-owl | 0.1 | 0.61 |
| Cinnamon Screech-owl | 0.1 | 0.61 |
| Togian Hawk-owl | 0.1 | 0.61 |
| Mayotte Scops-owl | 0.1 | 0.61 |
| Sulawesi Scops-owl | 0.09 | 0.61 |
| Common Scops-owl | 0.09 | 0.61 |
| Whiskered Screech-owl | 0.09 | 0.61 |
| Red-chested Owlet | 0.09 | 0.61 |
| Pearl Kite | 0.09 | 0.61 |
| Little Sparrowhawk | 0.09 | 0.61 |
| Little Sumba Hawk-owl | 0.09 | 0.61 |
| Cinnabar Hawk-owl | 0.09 | 0.61 |
| Reddish Scops-owl | 0.08 | 0.61 |
| Javan Scops-owl | 0.08 | 0.61 |
| Luzon Scops-owl | 0.08 | 0.61 |
| Sao Tome Scops-owl | 0.08 | 0.61 |
| Pallid Scops-owl | 0.08 | 0.61 |
| Oriental Scops-owl | 0.08 | 0.61 |
| Pearl-spotted Owlet | 0.08 | 0.61 |
| Ferruginous Pygmy-owl | 0.08 | 0.61 |
| Javan Owlet | 0.08 | 0.61 |
| Southern Saw-whet Owl | 0.08 | 0.61 |
| Seychelles Kestrel | 0.08 | 0.61 |
| Cloud-forest Pygmy-owl | 0.08 | 0.61 |
| Sangihe Scops-owl | 0.08 | 0.61 |
| Sandy Scops-owl | 0.07 | 0.61 |
| Mountain Scops-owl | 0.07 | 0.61 |
| African Scops-owl | 0.07 | 0.61 |
| Grand Comoro Scops-owl | 0.07 | 0.61 |
| Bearded Screech-owl | 0.07 | 0.61 |
| Northern Pygmy Owl | 0.07 | 0.61 |
| Andean Pygmy-owl | 0.07 | 0.61 |
| Austral Pygmy-owl | 0.07 | 0.61 |
| Cuban Pygmy-owl | 0.07 | 0.61 |
| Albertine Owlet | 0.07 | 0.61 |
| Costa Rican Pygmy-owl | 0.07 | 0.61 |
| Mindanao Scops-owl | 0.06 | 0.61 |
| Flammulated Owl | 0.06 | 0.61 |
| Eurasian Pygmy-owl | 0.06 | 0.61 |
| Collared Owlet | 0.06 | 0.61 |
| Northern Pygmy-owl | 0.06 | 0.61 |
| Yungas Pygmy-owl | 0.06 | 0.61 |
| Tamaulipas Pygmy-owl | 0.06 | 0.61 |
| Subtropical Pygmy-owl | 0.06 | 0.61 |
| Amazonian Pygmy-owl | 0.06 | 0.61 |
| Peruvian Pygmy-owl | 0.06 | 0.61 |
| Pygmy Falcon | 0.06 | 0.61 |
| Pied Falconet | 0.06 | 0.61 |
| Sokoke Scops-owl | 0.05 | 0.61 |
| Colima Pygmy-owl | 0.05 | 0.61 |
| Central American Pygmy-owl | 0.05 | 0.61 |
| Least Pygmy-owl | 0.05 | 0.61 |
| Long-whiskered Owlet | 0.05 | 0.61 |
| Philippine Falconet | 0.05 | 0.61 |
| Pernambuco Pygmy-owl | 0.05 | 0.61 |
| Elf Owl | 0.04 | 0.61 |
| Collared Falconet | 0.04 | 0.61 |
| Black-thighed Falconet | 0.04 | 0.61 |
| White-fronted Falconet | 0.04 | 0.61 |